

What is claimed is:

[Claim 1] A system for producing oil, comprising:

a submersible pump; and

a motive unit to power the submersible pump, the motive unit being a single device with a motor section and motor protector section to seal the motor section from surrounding fluid and to accommodate thermal expansion of an internal lubricating fluid during production of oil.

[Claim 2] The system as recited in claim 1, wherein the motor section comprises a motor section shaft and the motor protector section comprises a motor protector section shaft, the motor section shaft and the motor protector section shaft being affixed to each other.

[Claim 3] The system as recited in claim 2, wherein the motor section shaft and the motor protector section shaft are affixed to each other by a threaded joint.

[Claim 4] The system as recited in claim 2, wherein the motor section shaft and the motor protector section shaft are affixed to each other by an interference fit.

[Claim 5] The system as recited in claim 2, wherein the motor section shaft and the motor protector section shaft are affixed to each other by a cross bolt.

[Claim 6] The system as recited in claim 1, wherein the motive unit comprises an electrical cable connection having a spring biased terminal block movable between a sealed position and an open position.

[Claim 7] The system as recited in claim 1, wherein the protector section comprises a protector head having a transverse sand escape hole.

[Claim 8] The system as recited in claim 7, wherein the protector section further comprises a bearing and a shroud protecting the bearing from sand.

[Claim 9] The system as recited in claim 1, wherein the motive unit comprises at least one journal bearing having a replaceable wear sleeve.

[Claim 10] The system as recited in claim 9, wherein the replaceable wear sleeve is coupled to a shaft by a key and a retainer.

[Claim 11] The system as recited in claim 9, wherein the replaceable wear sleeve is coupled to a shaft by a tolerance ring.

[Claim 12] The system as recited in claim 1, wherein the motive unit comprises a plurality of bearings having self lubricating bushings.

[Claim 13] The system as recited in claim 1, wherein the motor section comprises a rotor bearing having a spring-loaded key.

[Claim 14] The system as recited in claim 1, wherein the motor section comprises an integral sensor to sense at least one well related parameter.

[Claim 15] The system as recited in claim 1, wherein the motive unit has an axis and a plurality of oil communication holes deployed at an angle with respect to the axis.

[Claim 16] A method of forming a motive unit for a submersible pumping system, comprising:

connecting a motor section shaft to a protector section shaft to form an axially affixed connection;

placing a sealed housing about the axially affixed connection to form a combined motor section and protector section; and

prefilling the combined motor section and protector section with a lubricating fluid.

[Claim 17] The method as recited in claim 16, further comprising moving the combined motor section and protector section to a desired wellbore location.

[Claim 18] The method as recited in claim 16, wherein connecting comprises utilizing a threaded coupler.

[Claim 19] The method as recited in claim 16, wherein placing comprises threadably engaging a motor section housing with a protector section housing.

[Claim 20] The method as recited in claim 16, further comprising providing the motor section with a terminal block that is spring biased toward a sealed

position, the terminal block being movable to an open position upon plugably receiving a cable connector.

[Claim 21] The method as recited in claim 16, further comprising forming a protector section head with lateral sand escape holes disposed above a protector section bearing.

[Claim 22] The method as recited in claim 16, further comprising providing the combined motor section and protector section with the journal bearing having a replaceable wear sleeve.

[Claim 23] The method as recited in claim 16, further comprising utilizing a bearing with a self lubricating bushing.

[Claim 24] The method as recited in claim 16, further comprising incorporating an integral sensor into the motor section.

[Claim 25] The method as recited in claim 16, further comprising forming oil communication holes at an angle with respect to an axis of the combined motor section and protector section.

[Claim 26] A method for protecting a submersible motor, comprising:
constructing a motive unit for a submersible pumping system with a motor section and a protector section combined; and
delivering the motive unit to an oil production well as a single unit.

[Claim 27] The method as recited in claim 26, further comprising prefilling the motive unit with a lubricating oil prior to delivering the motive unit to the production well.

[Claim 28] The method as recited in claim 26, further comprising axially connecting a motor section shaft with a protector section shaft.

[Claim 29] The method as recited in claim 28, wherein axially connecting comprises providing a single, unitary shaft.

[Claim 30] The method as recited in claim 28, wherein axially connecting comprises providing a coupling sleeve to create a permanent joint between the motor section shaft and the protector section shaft.

[Claim 31] The method as recited in claim 26, further comprising forming a sand escape hole in a head of the protector section.

[Claim 32] The method as recited in claim 26, further comprising utilizing journal bearings having replaceable wear sleeves in the motive unit.

[Claim 33] The method as recited in claim 26, further comprising utilizing journal bearings having self lubricating bushings in the motive unit.

[Claim 34] The method as recited in claim 26, further comprising utilizing rotor bearings having spring loaded keys.

[Claim 35] The method as recited in claim 26, further comprising placing a sensor within the motor section.

[Claim 36] The method as recited in claim 26, further comprising forming communication holes at an angle with respect to an axis of the motive unit to facilitate filling of the motive unit when positioned at a desired angle.

[Claim 37] A system for producing a fluid, comprising:

a motor section having an electrical cable connection, the electrical cable connection having a terminal block movable between a sealed position and an open position that enables fluid communication between a connection interface and an interior volume of the motor section.

[Claim 38] The system as recited in claim 37, further comprising a spring to spring bias the terminal block toward the sealed position.

[Claim 39] The system as recited in claim 38, further comprising a dielectric gasket to limit electrical tracking.

[Claim 40] The system as recited in claim 37, further comprising a protector section permanently coupled to the motor section.

[Claim 41] A system for producing a fluid, comprising:

a motive unit for driving a submersible pump, the motive unit having a journal bearing disposed about a drive shaft, wherein the journal bearing has a replaceable sleeve.

[Claim 42] The system as recited in claim 41, wherein the replaceable sleeve is keyed to the drive shaft.

[Claim 43] The system as recited in claim 41, wherein the replaceable sleeve is press fit onto the drive shaft with a tolerance ring.

[Claim 44] The system as recited in claim 41, wherein the journal bearing comprises a plurality of journal bearings, each journal bearing having a replaceable wear sleeve.

[Claim 45] The system as recited in claim 41, wherein the motive unit comprises a motor section and a protector section assembled as a single unit.

[Claim 46] A system for use in pumping a fluid from well, comprising:
an electric submersible pumping system having a motor section and a protector section, wherein at least one of the motor section and the protector section comprises a bubble sump to maintain any released gases in a dedicated volume.

[Claim 47] The system as recited in claim 46, wherein the motor section and the protector section are manufactured as a single unit.

[Claim 48] The system as recited in claim 46, wherein the bubble sump is disposed in the protector section.

[Claim 49] The system as recited in claim 46, wherein the bubble sump comprises a framework having the dedicated volume for collecting the released gases.

[Claim 50] The system as recited in claim 46, wherein the framework is disposed above a protector bag.

[Claim 51] The system as recited in claim 46, further comprising a relief valve system in communication with the dedicated volume to vent gas from the bubble sump.

[Claim 52] A method of protecting components of an electric submersible pumping system from accumulated gas, comprising:

locating a bubble sump in at least one of a motor section and a protector section of an electric submersible pumping system; and

creating the bubble sump with a dedicated volume sufficient to collect gas that would otherwise interfere with lubrication of internal components.

[Claim 53] The method as recited in claim 52, wherein locating comprises locating the bubble sump above a component susceptible to damage by exposure to accumulated gas.

[Claim 54] The method as recited in claim 52, wherein creating comprises providing a framework with the dedicated volume disposed within.

[Claim 55] The method as recited in claim 54, wherein providing comprises forming the framework with a plurality of vent holes through which gas flows to the dedicated volume.

[Claim 56] The method as recited in claim 52, wherein creating comprises creating the bubble sump around a rotatable shaft.